Wildlife-livestock interactions

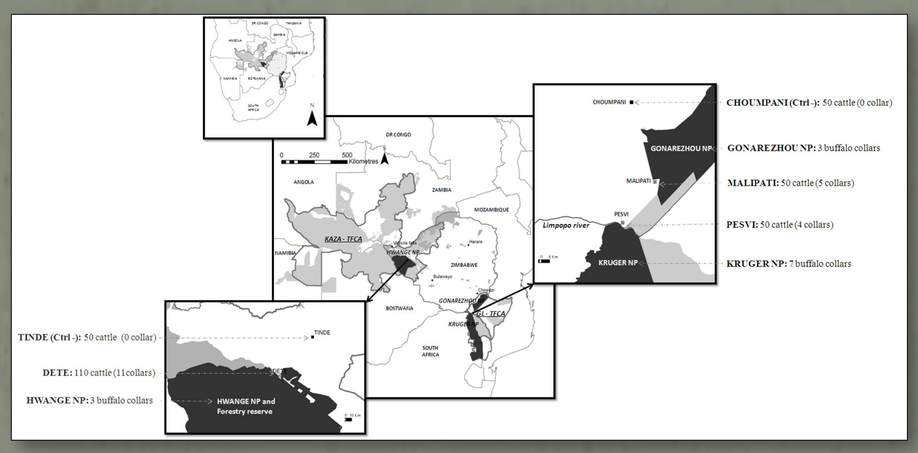
Frequency of contact with buffalo and transmission of foot-and-mouth disease in cattle populations at the periphery of protected areas in Southern Africa

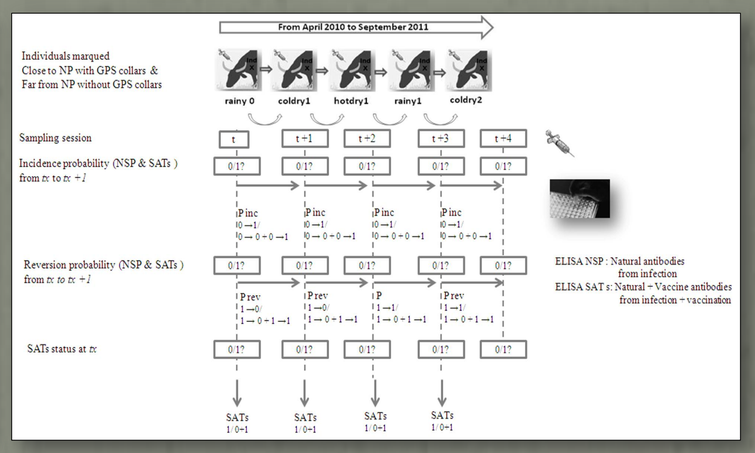
E Miguel[1234], V. Grosbois[1], A. Caron[1-4], T. Boulinier[3], D. Cornélis[1], H. Fritz[2], F. Jori[5], C. Foggin[6], P. Makaya, P. T. Tshabalala, M.de Garine-Wichatitsky[1-4]

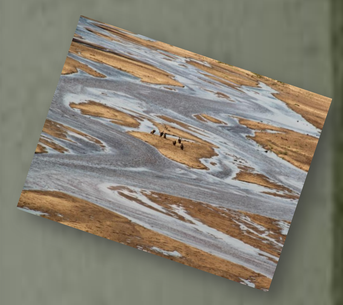
eve.miguel@cirad.fr

Context

A study implemented at the periphery of 3 National Parks (NPs) in **Zimbabwe**, with 3 permeable interfaces without fences and free animal movements
• 36 **GPS** collars were deployed on sympatric bovine to assess the contact between reservoir population : **African buffalo** (*Syncerus caffer)* and sensitive population : **cattle** (*Bos taurus, Bos indicus).* Simulteaneously a repeated serological survey was undertaken on cattle close to (Dete-Hwange, Malipati-Gonarezhou, Pesvi-Kruger) and far from NPs (Choumpani and Tinde) to estimate FMD **dynamic** with or without **vaccination** sessions on cattle.



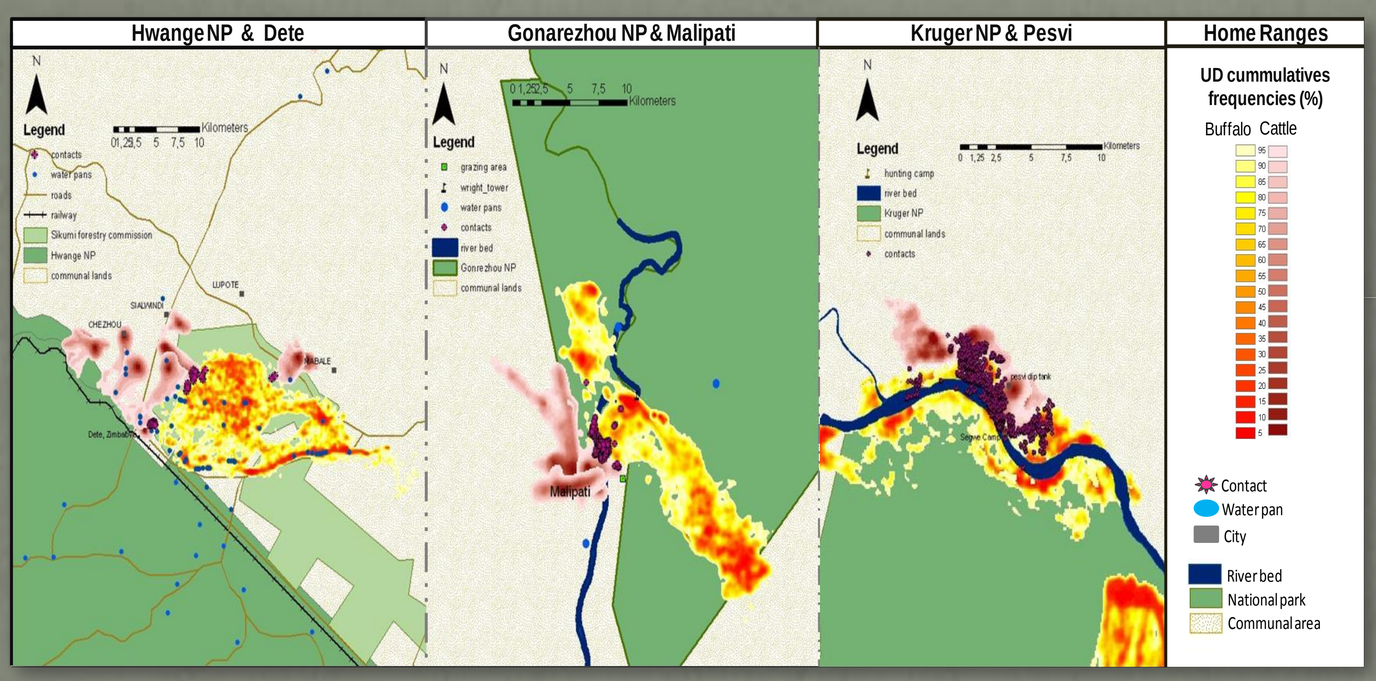




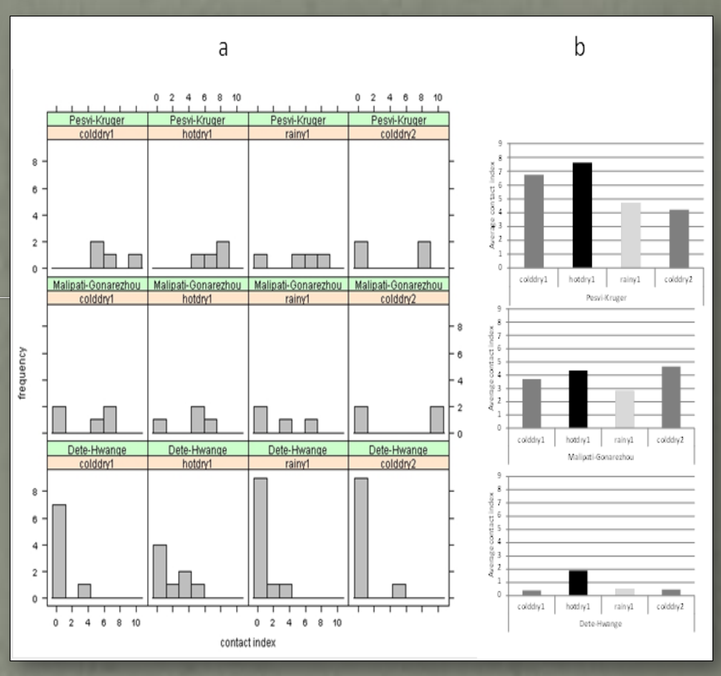
Results

- **Contact** definition for FMD transmission : cattle GPS record **15 days** and **300 meters** after buffalo GPS record
- Contacts variation between buffalo and cattle among sites , seasons and individuals (Cf. b)
- Contacts peak during Hot dry season : « risky period » for the 3 sites (Cf. b)
- Contacts often localized close to water : « risky area » (Cf. a)

a)



b)

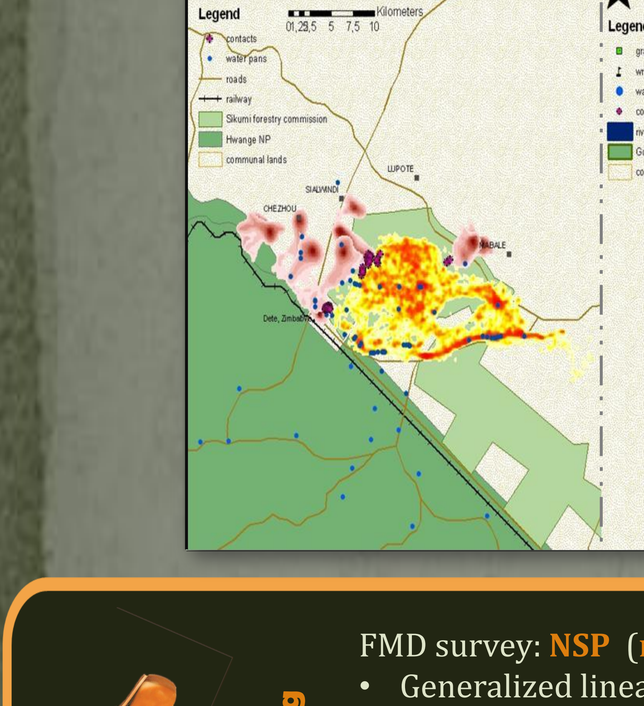


Modeling

FMD survey: **NSP** (natural antibodies detection) and **SATs** (SAT1 & 3 : natural and vaccinal antibodies detection) laboratory tests

- Generalized linear mixed model used (on NSP and SATs results) with individual and herd random effects
- Higher natural sero-incidence in sites close to NPs (Cf. c)
- Peak of natural sero-incidence in hot dry season (s.) except for Hwange-Dete (rainy s.) (Cf. c)
- Higher sero-reversion in sites far from NPs or with few contacts with buffalo or without vaccination (Cf. c)
- Peak of sero-reversion in cold dry s. (Cf. c)
- Sero-incidence and reversion (NSP & SATs) significantly related to contact rate with buffalo (Cf. d)

c)



Discussion

- First demonstration in natural condition of the African buffalo role as FMD virus reservoir
- Short lasting immunity investsment for cattle in endemic areas with light symptoms and low dectection
- Vaccination strategy seemed efficient with significant immunity protection for cattle but not enough to avoid the virus introduction from the wild compartment in risky areas and seasons. Frequency of vaccination sessions and number of cattle vaccinated have to be increased. Is the antigen used in vaccine adapted to the circulated strains?
- Why different levels of infection for similar unfenced interfaces ? Ressources distribution, owners strategies, predation risk? Theses questions have to be answered to understand the interaction mechanisms between wild and domestics populations to eradicate the disease at the continent scale

d)

1. Cirad UPR AGIRs, Department Environment and Society, France Montpellier
2. CNRS CNRS 5558 – LBBE UCB Lyon 1 - Bât. Grégor Mendel 43 bd du 11 novembre 1918 69622 VILLEURBANNE cedex
3. CNRS / CEFE 1919, route de Mende 34293 Montpellier cedex 5
4. Cirad Harare P.O. Box 1378 Harare, Zimbabwe
5. Cirad, UPR AGIRs, Mammal Researh Institute, Department of Zoology and Entomology, university of Pretoria, 0002, South Africa
6. Central veterinary Services and Wildlife unit, Harare, Zimbabwe

FAO/OIE GLOBAL CONFERENCE ON FOOT AND MOUTH DISEASE CONTROL
BANGKOK, THAILAND 27-28 JUNE 2012